

Stacking (and stocking) up!

The thermoforming sector seems to have been riding on the crest of a wave in recent times. **Steven Pacitti** finds out why

The days of the pandemic were undeniably challenging and saddening for humanity as a whole. At the same time, there is no denying that the packaging industry experienced some positive effects during this time, such as a notable rise in the consumption of takeaway food and beverages. A major beneficiary was the thermoforming sector, and not just because of the foodservice industry – there was also the surge in demand for medical plastics and face shields (visors).

Although there has been an inevitable post-pandemic downturn, thermoforming seems to be continuing to fare better than most sectors, with UK-based thermoformer LVF Packaging commenting that the cost-of-living increase has led to more people eating at home, therefore purchasing food in thermoformed packaging.

For Illig North America's managing director, not all aspects of the thermoforming industry have benefitted in the same way. "The thermoformed packaging sector is not monolithic, so I don't think all sectors boomed, or at least they didn't equally," says Conor Carlin. "It is true that both medical and food sectors saw large increases due to the need for takeout containers, such as PP clamshells. In North America currently, the market has softened as inventories decline and industry consolidation increases. The latter phenomenon leads to excess capacity, which is ultimately rationalised."

But, whatever side of this particular fence suppliers are on, there appears to be one significant post-pandemic uptick that thermoformers and thermoforming machinery suppliers can all agree on: the rise in automation.

The US market leads the way when it comes to automation, while Italy is spearheading Europe's growth, thanks in no small

part to the Italian Government's Industry 4.0 programme, which has included financial incentives since 2017.

While some of that growth in demand has come as a result of increasing hygiene requirements, the main catalyst has been the ongoing labour challenges that the industry faces.

"It seems that the labour challenges stemming from post-Covid times are here to stay and people are simply not as willing as they once were to perform manual labour in factory environments," admits Carlin. "For thermoforming specifically, this is about parts removal. Automatic sleeving, case packing and palletising systems are easily integrated into existing thermoforming lines."

Carlin does identify some space-related challenges, however, as older factories were not always built with such large footprints in mind. But, as thermoforming tool maker Marbach's vice-president of sales Hubert Kittelmann explains, the demand for fully automated turnkey systems will increase.

Turkish thermoforming machinery maker Inpak Makina is also witnessing the demand for automation at the end of production lines, with the feeling most acute in regions where labour costs are high. However, implementing these systems for multi-station thermoforming machines is more challenging than with tilt machines, explains Mustafa Eren, the company's marketing and business development manager.

"Although there are some solutions available, they are not cost-effective enough at the moment," he warns. Eren expects that third-party firms will deliver suitable

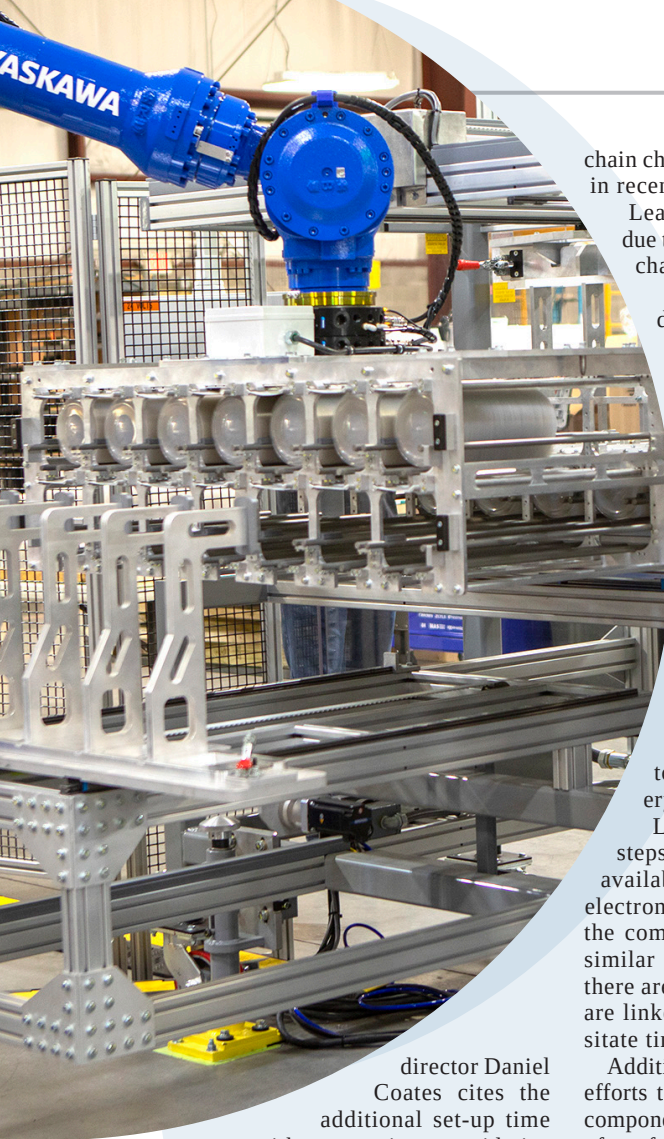
Above: Production efficiency is a key driver for automation, which is illustrated here on a BMG shuttle thermoforming machine

Below: Illig holds a patent for in-mould labelling in the thermoforming process



solutions, but adds that Inpak may shift its focus to developing its own solution if progress in this area is insufficient.

Catering largely for mid-size runs, LVF Packaging is looking at automation but believes that this predominantly rewards larger production runs where jobs are on for days at a time. Business development



chain challenges have been a major bugbear in recent months.

Lead times almost doubled for Inpak due to order intensity but also for supply chain reasons.

“Ceramic heaters and servomotor drives have been particularly challenging, but it has been getting better recently,” says Eren.

Marbach’s Kittelmann adds that specific electronic components still suffer from long lead times from Asia. Phillips admits that these challenges were significant, too, for BMG but it has overcome them by working with suppliers to ensure it has ample stock available to meet demand, while OMV Technologies operates warehouses in both Italy and the US in order to stock critical spare parts.

“Our supply chain teams have been managing our inventory levels to ensure as close to on-time delivery as possible,” Phillips adds.

Likewise, Inpak has taken proactive steps to ensure strong in-house stock availability, particularly in the area of electronic parts. Eren explains: “Some of the components are interchangeable with similar ones from alternative brands, but there are cases where specific components are linked to running software and necessitate time for a transition.”

Additionally, Inpak is investing in R&D efforts to identify and integrate alternative components that can deliver the same level of performance as the ones the company currently utilises. And that’s not all that Inpak is investing in, with plans in place to dramatically expand its footprint with a new factory.

“We start building the new factory this summer and it’ll be ready within two years,” Eren says. “We currently operate in a 6,000 sq m space, producing 50 machines a year across two sites and employing 109 staff and 26 engineers. The new plant in Istanbul will occupy 30,000 sq m and provide more production slots for machines, with room for growth.

“Our machines were operating in 45 countries at the beginning of 2022, but we expect to have expanded our reach to 50 by the end of 2023.”

Eren expects strong growth for the company on the back of its aim to “deliver the same quality as a more expensive European machine but 30 per cent cheaper”, but also anticipates steady growth for the sector as a whole.

“Some reports say that investments in the carton business are likely to be higher than plastics converting over the next two-to-three years, but after that, investments in plastics converting technologies are expected to grow more than cartons again towards 2030,” he says. “There are certain regions, like North America and the Middle East, that have more potential for growth at the moment.”

For LVF Packaging, Brexit has focused it on “everyone between Land’s End and John O’Groats”, explains Daniel Coates. “That’s not to say that we’re turning away from exporting, but at the moment there is more than enough work in the UK.”

Pockets of momentum

A study in 2020 identified adequate volumes of PET thermoform material in the US market to make it a viable target stream for increased recycling. With that in mind, and given that circularity is gaining momentum, is the thermoforming market moving fast enough when it comes to collection and recycling? Absolutely not, says Illig North America’s Conor Carlin, who adds that while it is true that there are adequate volumes, they are simply not being recovered and processed.

Carlin continues: “The reasons are well-known, if still thorny: a lack of long-term contracts and secure end-market demand; low virgin prices; unwillingness to invest by materials recovery facilities [MRFs] and reclaimers; and tension between kerbside recycling programmes and deposit return schemes. There are 9,000 recycling programmes in the US.”

That said, Carlin sees some pockets of momentum in California and Texas where companies are “doing good work”. He expects to present findings of a review of related studies into better understanding the flow of PET thermoforms through the current MRF systems at the SPE Thermoforming Division’s annual conference later this year in Cleveland, USA.

BMG’s Paul Phillips concurs that infrastructure for recycled material is not at the level it needs to be in the US to meet demand. He calls on government, industry and consumers to push infrastructure acceleration.

“Government mandates and restrictions drive change but not always fast enough,” he claims. “Innovation and the monetisation of plastics collection and recycling is the fastest way to reach the aggressive goals set out globally.”

Inpak believes that one of the key factors behind the anti-plastics campaigns is the inadequate availability of recycling facilities, and while countries have set targets, the timelines for achieving them often appear to be slow.

“Additionally, societies lack sufficient awareness about the importance of sorting products prior to recycling,” adds Eren. “We need to promote support for plastics and recycling and investments in this field.”

LVF’s Daniel Coates wants to see a single, independent, market-wide body bringing together thermoformers, recyclers and, most importantly, the retailers. “In the UK, the retailer is the demand, and if they want a tray of a certain material specification and/or colour then that is what they will get,” he explains.

Coates believes that a conjoined approach by the three supply chain sectors, along with an increase in the recycled material ▶

director Daniel Coates cites the additional set-up time with automation on mid-size runs as being likely to negate its use.

Aside from labour challenges, production efficiency is naturally a key driver for automation, and US-based BMG Solutions – which owns Brown, Lyle and GN – is well-versed in using it for counting, stacking, wrapping, bagging, bag-in-box, case packing and palletising.

Paul Phillips, the company’s vice-president of marketing and sales operations, expects significant growth in automation. BMG released the Mantis robotic trim press handling system last year for non-servo eject trim presses to improve product handling. BMG has also introduced robotics to many of its core automation products so that it can offer a variety of solutions.

“We see tremendous demand for in-process and end-of-line automation products as our customers look for improved efficiency and return on investment for each production line,” he says. “We know that expertise is leaving the industry at a higher rate than it can be replaced, so easy-to-use, simple products are a focus of our future machine development.”

From stack up to stock up

As a dynamic international market, packaging machinery is vulnerable to the impacts of trade disputes, geopolitical conflicts and issues such as the energy crisis, and supply

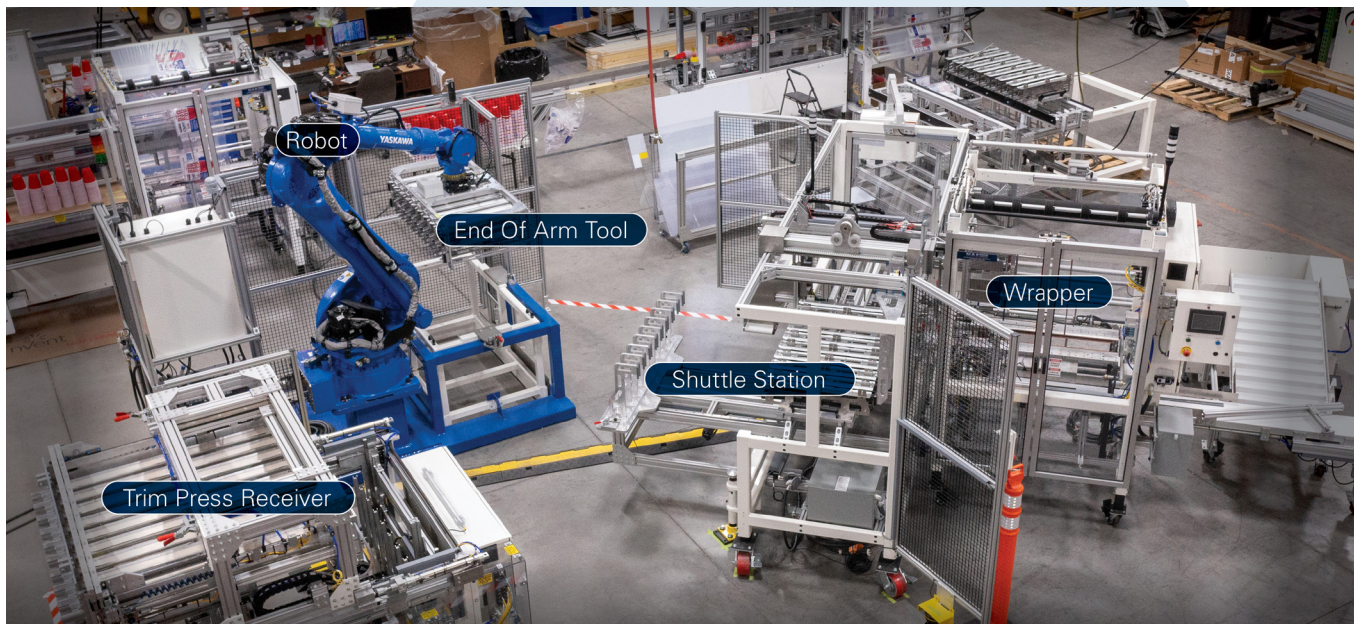


Photo credit: BMG Solutions

Above: In-process and end-of-line automation is a huge opportunity

Right: UK-based LVF Packaging cites Brexit as the reason for a surge in its domestic packaging business

content threshold in trays before they become exempt from the UK Plastic Packaging Tax, would dramatically increase the commercial viability of tray recycling.

When it comes to material use in the thermoforming sector, PET and PP are becoming more prevalent, but post-consumer recycle (PCR) goals and mandates are driving prices higher for recycled materials, primarily in PET. Conor Carlin is looking forward to the day when approval is granted for food-grade PCR PP.

Marbach's Hubert Kittelmann sees a trend for PET in Asia and PP in America (replacing the expensive paper wrap cup), but no clear focus or preference in Europe, although he suggests that processed food remains a trend while packages for one-way packaging are dramatically decreasing. BMG's Phillips, meanwhile, continues to see the transition to PET and rPET as the number one choice for material. He does, however, note significant interest in bio-based alternatives, including polylactic acid (PLA).

"With government regulations and targets for bio-based materials increasing, we believe that this will be an important area for OEMs like BMG to support," he adds.

Inpak does not see PLA and crystallised PET as hot topics any more, but, according to Mustafa Eren, films incorporating ethylene-vinyl alcohol are experiencing an increase in production. For him, PET, rPET and PP are the primary materials of choice going forward, with trends likely to include standardisation, particularly in light of global separation and recycling processes.



"We acknowledge the interest in expanded PP (EPP) but we have no expectation for considerable growth in usage of this material," he says.

The same is true of expanded PET, claims LVF's Coates, who looked at using the material to reduce tray weights but found that the reduction in material density could negatively affect its recyclability.

"The additional cost of the expanded processing, too, seemed to outweigh the material saving, although I'm sure the cost will reduce with time," he admits.

BMG's Phillips sees some EPP requests, but it remains small compared with rPET and the interest in bio-based products. He thinks that PP remains a growth material as well, so we should expect EPP to become more of a focus. Illig's Conor Carlin is excited about developments in bio-based PP.

Despite all of this, consumers tend to focus on the products that are the easiest to recycle. With that in mind, LVF is set to bring its GravityTray to market soon, which eliminates the unrecyclable soaker

pad and glue to leave a fully recyclable mono-PET tray. This comes at a time when the company recently installed a new thermoforming line in order to reduce tooling costs and serve customers' needs with smaller production runs.

OMV Technologies' co-owner and chief technology and innovations officer, Mark Strachan, notes not only growth in EPP but also foamed HDPE and PET.

"Most are done within a sandwiched core to lightweight the product and offer superior topload strength," he says. "OMV is in the process of working with Promix to jointly showcase the foaming capabilities and present customers with production-ready sampling."

Smart futures

A lot of the focus on the machinery side has been on energy efficiency and making things 'smarter'.

"Smart tools are the future and almost all large tools we deliver have implemented systems to monitor process and quality parameters," says Marbach's Hubert Kittelmann.

“The lack of skilled operators drives the demand for pre-set and simple to use tooling with high output numbers.”

Understandably, energy consumption remains the biggest driver for innovation and Inpak has achieved an additional 5 per cent increase in efficiency through the redesigned mechanical construction of its heater trays and their surroundings.

“Recognising that minimising both planned and unplanned downtime can lead to energy savings, we prioritise the availability of our machines for continuous production,” explains Mustafa Eren. “Providing meaningful digital technologies will be our next step in the near future.”

Illig machines are built with a number of energy efficiency features, such as regenerative braking, heater shields, and self-adaptive start-up technology. The vast majority of machinery today runs on servo-driven platforms, primarily in chain indexing, press movements, and part removal systems.

“A servo drive generates energy during braking since it works like a generator,” points out Conor Carlin. “Usually, this braking energy is discharged to the surroundings as heat. Feedback drive technology means that the energy generated by the brakes flows into the intermediate circuit storage (battery). The drive controllers are connected to this circuit, allowing the energy to be used for a different servo drive. In



Mustafa Eren told Eco-plastics in Packaging during Interpack that Inpak Makina is about to start work on a 30,000 sq m facility that will be completed within two years

some cases, we are able to show significant reductions in energy required per 1,000 parts, specific energy per part throughput, and specific energy per sheet throughput.”

OMV Technologies is eliminating the use of hydraulics and pneumatics where possible and turning to more energy efficient drive systems. The company is also incorporating dynamic braking systems that allow the feedback of energy.


BMG claims to already boast the lowest energy-consuming thermoforming machines

on the market today, with Paul Phillips stating that the GN Contact Heat machine series uses the lowest energy and produces the lowest plastics web scrap rates in the industry.

The GN3021DX uses less than 7kW per hour, while the other BMG thermoforming machines are all servo-driven machines with regenerative capabilities.

“The ovens on our machines all use infrared heaters that are some of the most energy-efficient heaters in the world, but we are working with our suppliers to continually improve,” says Phillips.

Compressed air consumption, meanwhile, has a double impact according to Marbach’s Kittelmann, who states that a smart system can not only reduce the energy bill but also improve the cycle time, and therefore boost efficiency.

As such, the initial higher investment is becoming more readily accepted by companies as they monitor their energy consumption and look more seriously than in the past for ways to improve it. 

More information from:

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Illig North America	illig-na.com
Inpak Makina	inpakmakina.com
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